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ABSTRACT

This paper discusses the findings from a study that investigated the information processing characteristics of 93 children (ages 8-16) who have been diagnosed as having either attention deficit hyperactivity disorder (ADHD) only, ADHD-Predominately Inattentive Type, and combined ADHD and learning disabilities (LD). Thirty-nine average students, who had no identified disabilities, were used to compare the three groups of children with ADHD. Results from a discriminate functions analysis showed that the Learning Efficiency Test-II (LET-II) test pattern performance was 83.9 percent successful in differentiating between the three ADHD groups from the average group. The overall group classification rate was 57.6 percent. Examination of the subtest profile of the three groups with ADHD indicated an unusual recall pattern in that there was either an inverted-V or V profile when comparing the impact of verbal interference on serial free recall memory span. The average group showed a more typical profile of losing incrementally more information with each additional source of verbal interference. Results indicate that there are substantial processing differences among the three groups of learners in terms of their levels of information retention and recall, but that there exist characteristic patterns of retention and recall that are similar across the groups. (Author/CR)

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Processing patterns of ADHD, ADHD-I, and ADHD/LD children on the LET - II

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Processing patterns of ADHD, ADHD-I, and ADHD/LD children on the LET - II.

Abstract

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An evolving body of research has found that many children with ADHD have accompanying deficits in their ability to process and retain new linguistic materials in memory. This presentation examines the results from a series of recent studies using the *Learning Efficiency Test - II* (Webster, 1998) to identify the information processing characteristics of 93 children who have been diagnosed as having either ADHD only, ADHD-Predominantly Inattentive Type, and Combined ADHD and LD. Thirty-nine Average students, who had no identified disabilities, was used to compare the three ADHD group.

Results from a discriminant functions analysis showed that LET-II test pattern performance was 83.9% successful in differentiating between the three ADHD groups from the Average group. The overall group classification rate was 57.6%. Examination of the subtest profile of the ADHD groups indicated an unusual recall pattern in that there was either an inverted-V or V profile when comparing the impact of verbal interference on serial free recall memory span. The Average group showed a more typical profile of losing incrementally more information with each additional source of verbal interference.

Processing patterns of ADHD, ADHD-I, and ADHD/LD children on the LET - II.

Introduction

All human learning and behavior depend on ones' ability to attend to the important characteristics of information so that it can be stored, retained, accessed, and retrieved for later use. Deficits with attention often result in significant problems with either school achievement for children or work success for adults. Interestingly, though, there is no operationally clear definition of the construct called "attention." Consequently, a variety of testing procedures are used in applied settings to measure attention. These procedures include subtest clusters from an intelligence test, reaction time tasks, vigilance tasks, continuous performance tests, maze completion tests, and behavior rating scales.

In 1990 (Barkley, 1990) it was estimated that about 3 to 5 % of children had some form of an attention deficit disorder. Current revised estimates of the incidence of these attending problems, referred to collectively as ADHD, range up to 9.5 % of all school-aged children (Barkley, 1998). These data suggest that either the frequency of children with attention problems is increasing at dramatic and steady rates or that the methods used to make these diagnoses are not effective in accurately differentiating children with ADHD from those who have who do not have this disorder.

An evolving body of research has suggested that many ADHD children have memory and information processing

deficits when compared with their same-aged average peers (Beech & Awaida, 1992; Siegel, 1992). These memory deficits often involve difficulties at the level of the working memory where there are high demands placed on cognitive organizational strategies, sustained concentration, and mental effort (Douglas & Benezra, 1990; Siegel & Ryan, 1989). Moreover, modality-specific deficits in the areas of visual and/or auditory information processing are sometimes evident in these children as well as in those who have learning disabilities (Siegel & Ryan, 1989).

This study involves a comparison of the information processing characteristics of 93 children between the ages of 8 years, 0 months and 16 years, 0 months who had been diagnosed as either ADHD only, ADHD, Predominantly Inattentive Type, or ADHD and LD with 39 children who had no identified problems of any kind. All diagnoses of ADHD had been made by at least two professionals, one of whom was a licensed physician and the second a licensed psychologist. Diagnoses of LD were made by either a licensed psychologist and/or school child study team.

Following the assignment of these diagnoses, each child was individually administered the *Learning Efficiency Test - II* (LET-II; Webster, 1998) by a licensed psychologist. Findings from this study indicate that there are substantial processing differences among the three groups of learners in terms of their levels of information retention and recall, but that there exist characteristic patterns of retention and recall that are similar across the groups.

Conclusions and Findings

1. The LET-II discriminated among the four groups of learners at a rate of 57.6% accuracy. Chance would predict that a 25% group placement accuracy rate would exist.

2. The ADHD, ADHD-I, and ADHD-LD groups seem to be closely related in terms of how they recall linguistic information. Twenty children from the latter two groups had test patterns that were closely similar to those of the ADHD group.

3. The LET-II correctly identified 78 of 93 total participants, for a 83.9% accuracy rate.

4. Nine of 39 average children were incorrectly identified as having one of the three types of ADHD based on the LET-II (23.1% false positives rate).

5. ADHD may be a disorder where the child is unable to access and retrieve information from either short-term and/or long term memory quickly and efficiently. Because of this dysregulation they are not able to keep up with the pace of new information, especially when engaged in social transactions.

Table 1

Descriptive Statistics for the Four Groups

	ADHD		ADHD-I		ADHD-LD		AVERAGE	
VARIABLE	M	SD	M	SD	M	SD	M	SD
Reading	90.4	13.7	88.8	15.2	92.0	25.0	104.2	17.8
Math	89.7	14.1	84.9	15.2	88.7	16.8	104.0	21.5
Writing	86.3	12.2	85.9	11.0	82.4	23.0	97.4	18.7
Verbal IQ	90.4	11.4	88.2	12.7	97.4	18.9	96.0	18.6
Perf IQ	88.8	14.4	87.9	13.1	97.8	11.6	104.2	22.3
FSIQ	88.9	11.8	87.1	13.0	97.3	15.9	103.0	19.0
DSpan	8.9	2.9	8.6	2.9	8.9	2.6	11.0	2.9
VComp	92.1	13.0	89.6	14.2	98.7	18.4	104.2	16.4
POrgn	90.6	15.8	88.7	15.0	99.2	14.0	99.7	20.0
FFD	92.4	14.0	89.0	13.2	93.3	15.5	101.1	21.3
Rdg/GLE	4.3	2.1	4.4	2.2	5.0	2.1	5.3	2.8
Math/GLE	4.6	2.3	4.5	2.1	4.9	2.2	5.6	2.0

Table 2

Descriptive Statistics for the Four Groups on the LET-II

	ADHD		ADHD-I		ADHD-LD		AVERAGE	
Variables	**M**	**SD**	**M**	**SD**	**M**	**SD**	**M**	**SD**
Visual	100.4	19.9	85.7	20.2	93.0	21.8	102.3	20.5
Auditory	93.3	17.2	93.8	21.0	91.4	20.6	100.1	21.0
Global	97.3	26.3	88.2	27.3	88.1	31.3	104.5	19.3
VOI	8.5	2.4	7.0	2.2	9.0	2.6	10.3	2.1
VOS	7.0	3.4	7.1	3.8	5.1	4.2	8.3	3.0
VOL	8.6	3.8	6.6	3.6	6.0	4.5	7.2	3.1
VUI	9.3	2.7	8.0	2.5	9.5	2.5	11.9	3.2
VUS	9.0	3.3	7.9	2.9	8.7	3.2	10.7	3.0
VUL	9.1	2.9	8.4	3.1	9.1	2.2	9.8	3.0
AOI	8.6	2.5	8.9	3.1	8.7	2.0	11.4	2.1
AOS	5.9	3.1	7.8	4.2	6.8	4.2	9.2	3.0
AOL	5.8	3.3	5.7	3.3	6.7	4.1	7.7	3.2
AUI	8.9	2.5	9.0	3.1	9.7	2.6	12.5	3.4
AUS	8.0	3.1	9.4	3.2	8.6	3.3	12.0	2.5
AUL	8.6	3.1	8.5	2.4	8.7	3.6	11.1	2.2

Table 3

Correlations for the LET-II with Typical Psychological Tests Used in the Schools

	LET-II Variables		
Tests	**Visual Memory**	**Auditory Memory**	**Global Memory**
Verbal IQ	.20	.26, =.024	.18
Performance IQ	- .06	.06	- .07
Full Scale IQ	.09	.18	.07
Digit Span	.13	.31, p=.008	.20
Woodcock-Johnson Tests			
Reading	.33, p=.004	.40, p=.000	.35, p=.002
Mathematics	.12	.34, p=.003	.17
Written Language	.05	.21	.14
LET-II			
Visual Memory		.32, p=.002	.77, p=.000
Auditory Memory			.78, p=.000

Table 4

Discriminant Functions Analysis Using the LET-II Subtests

	Predicted Group Membership			
Actual Group	ADHD	ADHD-I	ADHD-LD	Average
ADHD (N=43)	30	4	5	4
ADHD-I (N=27)	10	11	1	5
ADHD-LD (N=23)	10	2	5	6
Average (N=39)	4	4	1	30

OVERALL CLASSIFICATION RATE: 57.6%

AVERAGE vs. ADHD DIFFERENTIATION: 83.9% (n=78/93)

AVERAGE CORRECTLY CLASSIFIED: 76.9% (n=30/39)